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(54) **Apparatus for controlling window blinds and awnings.**

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FR-A- 2 557 397

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Description

The invention relates to an apparatus for controlling a motor used in the lifting and lowering of a window blind or the winding in and out of an awning, including a signal receiving means for receiving signals deriving from the rotor rotation, and means connected to the signal receiving means to receive signals for stopping the motor at the end positions of the blind or awning, the motor being a direct current motor in which small voltage or current pulses are induced in the cables leading to the motor every time the sections of the rotor pass through the magnetic field of the field windings, whereby the signal receiving means includes an electrical counter which receives said pulses and further includes a memory, which stores the number of pulses, required for the blind or awning to move between its end positions.

Automation for such window blinds is such that the blind can be raised or lowered electrically. A small electric motor usually operating through a gearbox, winds up the lifting cord or band of the blind to raise it and winds down the cord or band to lower it. A problem that arises is how the electric motor is to be stopped when the blind is fully raised or fully lowered. At present the motor is topped by microswitches which have been built into the blind, and which open when the blind is fully up or fully down. A similar system wich microswitches is used to stop the motor of an awning when the awning is fully extended or fully retracted. However, such systems involve considerable difficulties with installation, are relatively expensive, tend to be unreliable and involve time consuming initial installation.

From FR-A-2 557 397 it is known to have an electrical counter which receives pulses from the driving motor and a memory, which stores the number of pulses, required for the blind or awning to move between its end positions.

The object of the invention is to improve such an arrangement, whereby a second signal should be generated and used to reset the electrical counter.

The characteristics of the invention appear from the following claims.

Embodiments of the invention are in the following with reference to the accompanying drawings described more in detail, wherein also further advantages are described.

Figure 1 shows the voltage being supplied to a direct current motor and pulses arising from the rotation of the rotor.

Figure 2 shows a venetian blind with the motor and gearbox, and winding reels for the lifting cords or bands.

Figure 3 shows another type of window blind with a similar winding mechanism.

Figure 4 shows a roller blind with its system of winding.

Figure 5 shows an awning with its motor and gearbox, installed in the winding tube.

Figure 6 illustrates a typical digital counting apparatus and the functions that it has.

Figure 7 shows an electrical circuit for controlling the motor which includes the digital counting unit.

In Fig. 1 the fluctuations in voltage or current 1, that occur when the segments of the rotor pass through the magnetic field of the stator, are shown.

In Fig. 2 is shown the construction of a venetian blind with motor 3, and gearbox 4 in the top rail 2. The gearbox drives an axel 6, which turns the hubs 5, upon which the lifting cord or band 7 is wound. There may be several variations of method of winding up the lifting cord or band, however the use of motor and gearbox turning an axel inside of the top rail and being used to wind up the lifting cords or bands is common to the designs.

In Fig. 3 the construction of a window blind made with folded material is shown. This has a top rail 2, with a motor 3, and gearbox 4, which is connected to an axel 6, which turns winding hubs 5, upon which the lifting cords or band 7, are wound. Again there may be a variation in the method of winding up the lifting cords or bands, however the use of motor, gearbox and axel is common to all methods.

In Fig. 4 the construction of a roller blind is shown. This has a motor 3, and gearbox 4. The gearbox causes the tube 8, to rotate, thereby rolling the blind up or allowing it to come down.

In Fig. 5 the construction of an awning is shown. This is similar in design to the roller blind in Fig. 4, however there are spring loaded arms 9, which streach the awning material 10. There is a motor 3, and gearbox 4, which causes the tube 8 to rotate rolling up the awning material 10.

Fig. 6 illustrates the functions of the digital counter used by the invention. The impulses to the counter are fed to the counter via input 12. A signal telling the counter if impulses are to be added or subtracted, that is if the blind or awning is being let down or being lifted up is given to the counter via input 11. The value on the counter is reset preferably to zero, when at the top position by a signal to input 13. When the value in the counter equals the value in the memory section of the unit then a signal is given via output 14. The value currently in the counter can be transferred to the memory section by manually closing switch 15 on input 16. There are possible alternative combinations of counter units and separate memory units that can be used to achieve the same operative function as described above.

Fig. 7 illustrates a typical electric circuit that can be used to detect the pulses in the cables leading to the motor and feeding them to the counter unit where they are added or subtracted. Unit 17 is a standard integrated circuit which is used to stop and start the motor. The connection between unit 17 and earth via re-

sistance 24 causes a fluctuating voltage over resistance 24, which is proportional to the fluctuating motor current. This fluctuation voltage is coupled via condensor 25 to an integrated circuit 18 which amplifies the voltage pulses so that they can operate the counter unit 20.

Amplifier 19 compares the fluctuating voltage at resistance 24 with a reference voltage and when this voltage rises above the reference voltage, as will occur when the motor is nearly stopped then the amplifier sends a signal to the counter resetting it to zero. A signal is sent at the same time to switch 21, which stops the motor. Switches 23 are manually operated switches for raising or lowering the blind or awning.

For the small motors used in blind automation there will usually be three pulses for each revolution of the rotor. These pulses, or a proportion of them, are fed to the digital counting apparatus. The pulses are then used to control the blind motor in the following way:

Initial setting

The blind is raised to its highest position when the counting apparatus is set to zero.

The blind is then run to its lowest position when the sum of the pulses due to the motors rotation is stored in a memory. This value is then equivalent to the blinds lowest position.

After this the counter operates in the following way:

Operating

When the blind is lowered the pulses due to the motors rotation are summed up and when the number reaches the number stored in the memory the motor is stopped - the blind having reached its lowest or bottom position.

When the blind is raised the pulses due to motors rotation are subtracted and when the number of pulses recorded by the counter reaches zero the motor is stopped - the blind having reached its highest or top position.

According to the invention there is now a specific arrangement to check that the blind has reached its top positions and not just to rely solely on the pulse counter being zero.

The electric current used by the motor is measured and when the blind is fully raised and can go no further the speed of the motor falls and the current to the motor increases rapidly. When the current has increased over a predetermined value then the blind is at its top position. The motor is then stopped and at the same time a signal is sent to the digital counting apparatus setting it to zero. This method of stopping the blind at its top position is generally preferred. This is because the counting apparatus is zeroed each time the blind is operated and the possibility for wandering of the set top and bottom positions caused, for example, by an accumulation of a small error in the counting of the pulses, is avoided. An additional advantage of zeroing the top position of the blind each time it is raised is that if the lifting cords or bands should streatch with time because of sunshine or because of heat or cold then there is an automatic compensation for this because the blind is always raised to its top position and then lowered a fixed distance, i.e. lowered a fixed number of revolutions of the winding axel or winding reel.

An interesting advantage of the system is that the lifting or lowering of the blind may be stopped in an intermediate position and when the raising or lowering is continued the blind continues to its correct end position. This is because the number of pulses equivalent to the intermediate position is retained in the counter while the blind is stationary and counting continues when the blind moves again.

If the system is used to control an awning instead of a blind then the fully rolled up position of the awning corresponds to the top position of the blind and the fully extended position of the awning corresponds to the fully down position of the blind. The awning has a direct current motor and gearbox installed in the winding tube which causes the tube to rotate. The pulses from the motor as it rotates are fed to a digital counting apparatus and the number of revolutions of the motor thereby known. The counting apparatus is zeroed at the fully rolled up position by measuring the current fed to the motor and setting the counter to zero when the current exceeds a set value. The awning is then fully extended and the sum of the pulses due to the motors rotation is stored in the memory. This value being used to stop the motor in future operations at the awnings fully extended position.

Claims

1. An apparatus for controlling a motor used in the lifting and lowering of a window blind or the winding in and out of an awning, including a signal receiving means for receiving signals deriving from the rotor rotation, and means (17) connected to the signal receiving means to receive signals for stopping the motor (22) at the end positions of the blind or awning, the motor being a direct current motor in which small voltage or current pulses are induced in the cables leading to the motor every time the sections of the rotor pass through the magnetic field of the field windings, whereby the signal receiving means includes an electrical counter which receives said pulses and further includes a memory, which stores the number of pulses, required for the blind or awning to move between its end positions, **characterized** in that

the signal reveiving means is connected to the cables of the motor (22) via an earth circuit, which includes a resistance (24) and a condenser (25), whereby a further comparator means (19) is connected to said earth circuit to decide when the current to the motor increases over a certain operating value and to hereby emit a second signal to the counter to reset it to zero, this increase of the current to the motor being a result of a decrease in speed of the motor or a stoppage due to the blind or awing having reached one of its end positions.

2. An apparatus according to claim 1, **characterized** in that said comparator means (19) includes a current meter, so that the value of the operating current is compared with a reference current.

3. An apparatus according to claim 1, **characterized** in that said comparator means (19) includes a voltmeter which is connected to said earth circuit, the value of the voltage over said resistance (24) being compared with a reference voltage.

Patentansprüche

1. Vorrichtung zum Steuern eines Motors, Wer zum Heben und senken einer Jalousie oder zum Aus- und Einfahren einer Markise dient, mit einem Signalempfangsmittel zum Empfangen von Signalen, die aus der Rotordrehung abgeleitet sind, und einem an dem Signalempfangsmittel angeschlossenen Mittel (17) zum Empfangen von Signalen zum Anhalten des Motors (22) in den Endpositionen der Jalousie oder Markise, wobei der Motor ein Gleichstrommotor ist, bei dem kleine Spannungs- oder Stromimpulse in den zum Motor führenden Kabeln jedesmal dann induziert werden, wenn die Abschnitte des Rotors das Magnetfeld der Feldwicklungen durchlaufen, wobei das Signalempfangsmittel einen elektrischen Zähler, der die erwähnten Impulse erhält, und einen Speicher enthält, der die Anzahl der Impulse speichert, die die Jalousie oder Markise benötigt, um sich zwischen ihren Endpositionen zu bewegen, dadurch gekennzeichnet, daß das Signalempfangsmittel mit den Kabeln des Motors (22) über eine Erdschaltung verbunden ist, die einen Widerstand (24) und einen Kondensator (25) aufweist, und daß ein Komparatormittel (19) mit der erwähnten Erdschaltung verbunden ist, um zu entscheiden, wann der Motorstrom einen vorbestimmten Betriebswert überschreitet, und dadurch ein zweites Signal dem Zähler zuzuführen, um ihn auf Null zurückzusetzen, wobei der Anstieg des Motorstroms die Folge einer Abnahme der Motordrehzahl oder eines Halts ist, wenn die Jalousie oder Markise eine ihrer Endpositionen erreicht.

2. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß das Komparatormittel (19) ein Strommeßgerät aufweist, so daß der Wert des Betriebsstroms mit einem Bezugsstrom verglichen wird.

3. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß das Komparatormittel (19) ein Spannungsmeßgerät enthält, das mit der erwähnten Erdschaltung verbunden ist, wobei der Wort der Spannung an dem erwähnten Widerstand (21) mit einer Bezugsspannung verglichen wird.

Revendications

1. Appareil pour la commande d'un moteur utilisé pour faire monter ou baisser un rideau roulant ou pour l'enroulement et le désenroulement d'une bâche, comprenant des moyens de réception de signal pour recevoir des signaux liés à la rotation du rotor et des moyens (17) reliés aux moyens de réception de signal pour recevoir des signaux d'arrêt du moteur (22) lorsque le rideau roulant ou la bâche sont dans leurs positions extrêmes, le moteur étant un moteur à courant continu dans lequel de petites impulsions de courant ou de tension sont induites dans les câbles parvenant au moteur chaque fois que les sections de rotor passent à travers le champ magnétique des enroulements de champ, de façon que les moyens de réception de signal comprennent un compteur électrique qui reçoit lesdites impulsions et comprennent, en outre, une mémoire qui stocke le nombre d'impulsion nécessaires au rideau ou à la bâche pour se mouvoir entre leurs positions extrêmes, caractérisé en ce que les moyens de réception de signal sont connectés aux câbles du moteur (22) par l'intermédiaire d'un circuit à la masse, qui comprend une résistance (24) et un condensateur (25), un comparateur (19) étant de plus connecté audit circuit à la masse pour déterminer à quel moment le courant du moteur dépasse une certaine valeur de fonctionnement et d'émettre, en conséquence, un second signal au compteur pour le remettre à zéro, un tel accroissement de courant dans le moteur étant le résultat d'une diminution de vitesse du moteur ou d'un arrêt provoqué lorsque le rideau ou la bâche atteint une de ses positions extrêmes.

2. Appareil selon la revendication 1, caractérisé en ce que ledit comparateur (19) comprend un ampèremètre de telle sorte que la valeur du courant

de fonctionnement soit comparée avec un courant de référence.

3. Appareil selon la revendication 1, caractérisé en ce que ledit comparateur (19) comprend un voltmètre qui est connecté au circuit à la masse, la valeur de la tension au-dessus de ladite résistance (14) étant comparée avec une tension de référence.

FIG. 1

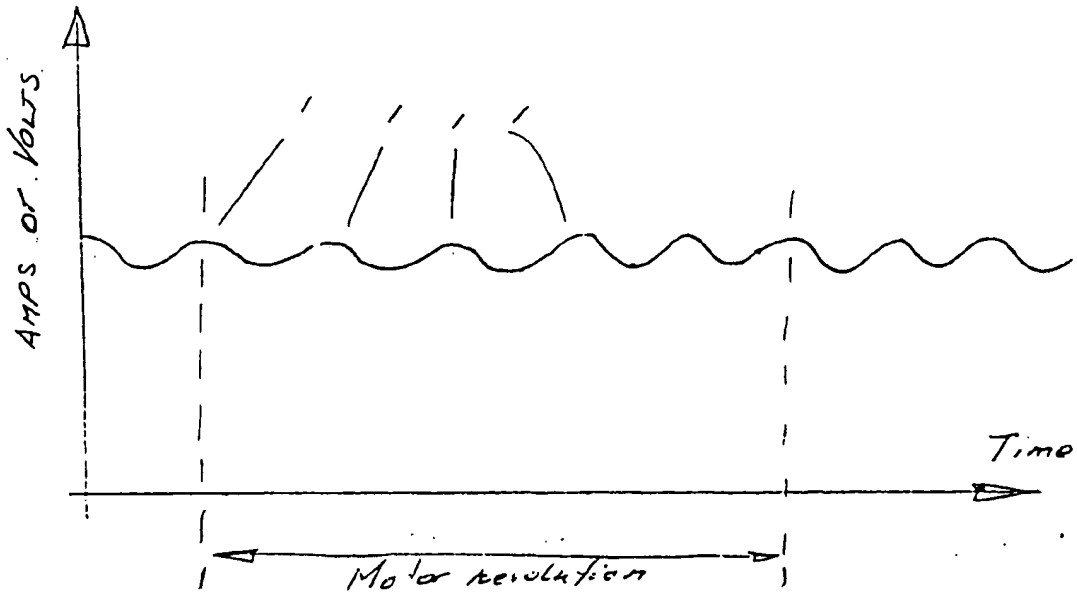

FIG. 2

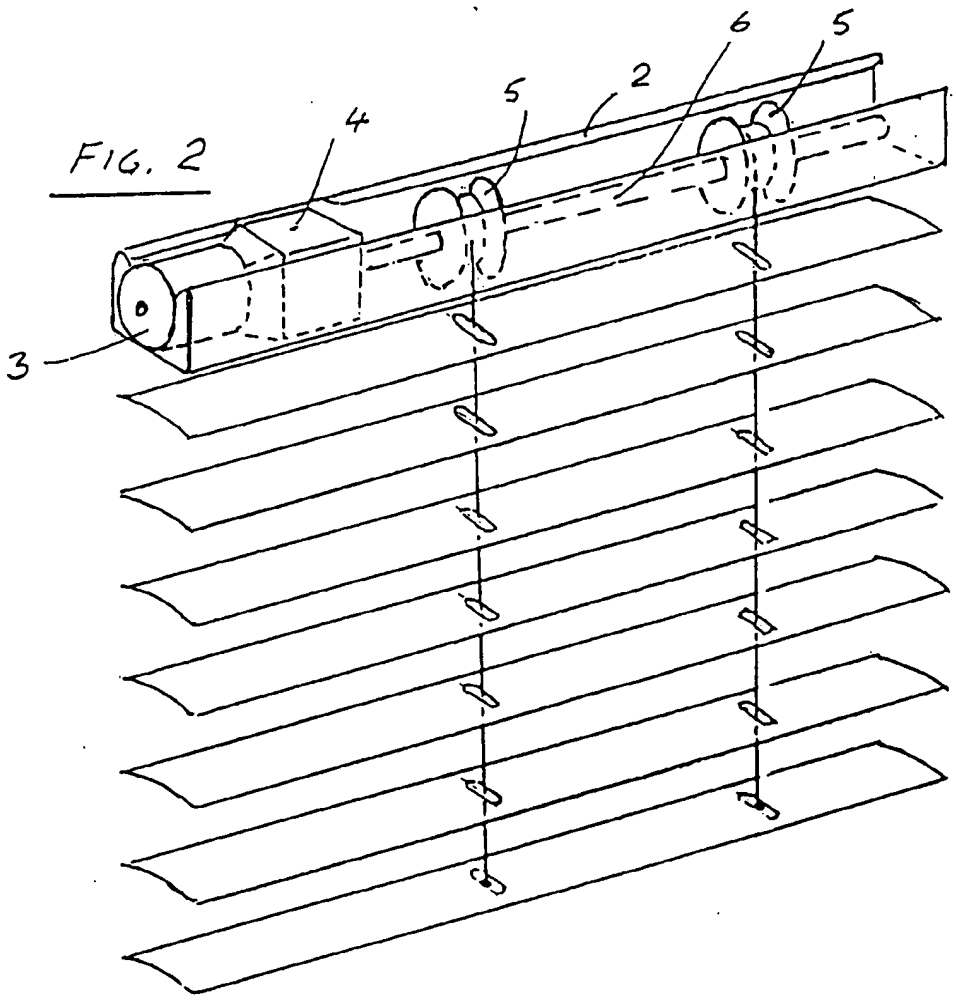

FIG. 3

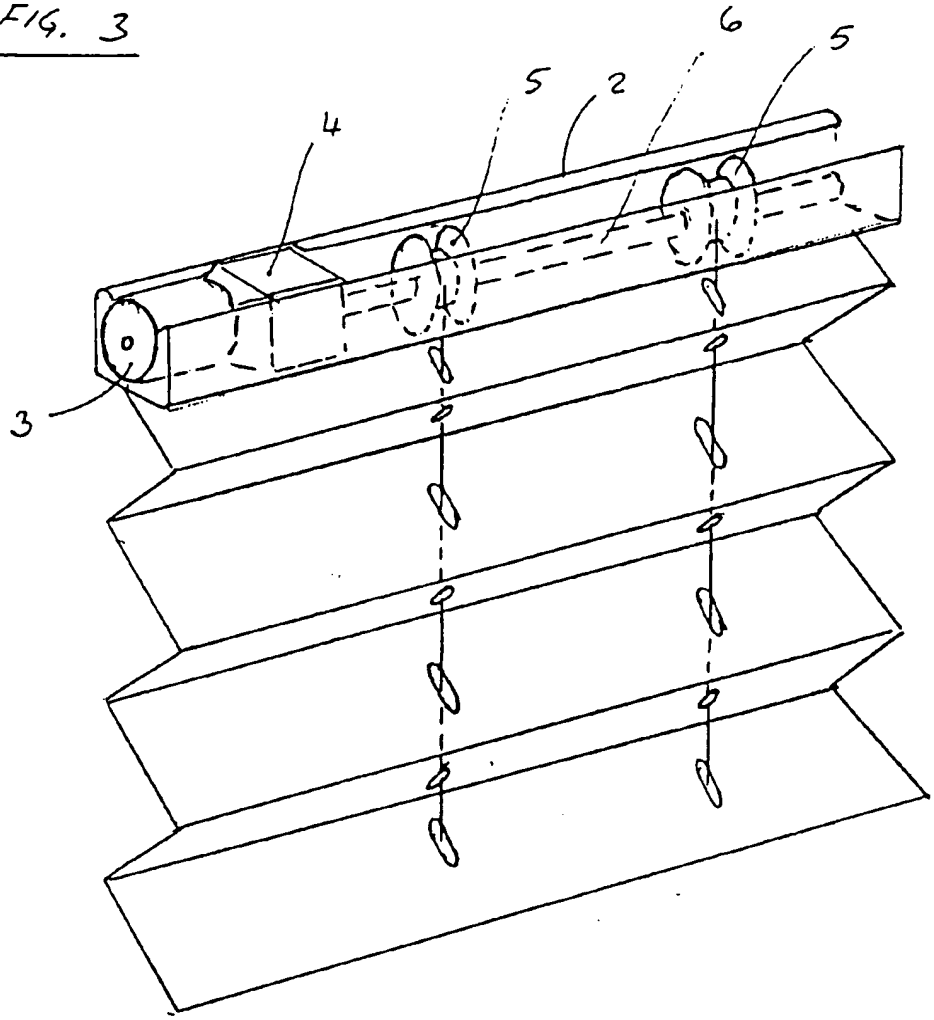

FIG 4.

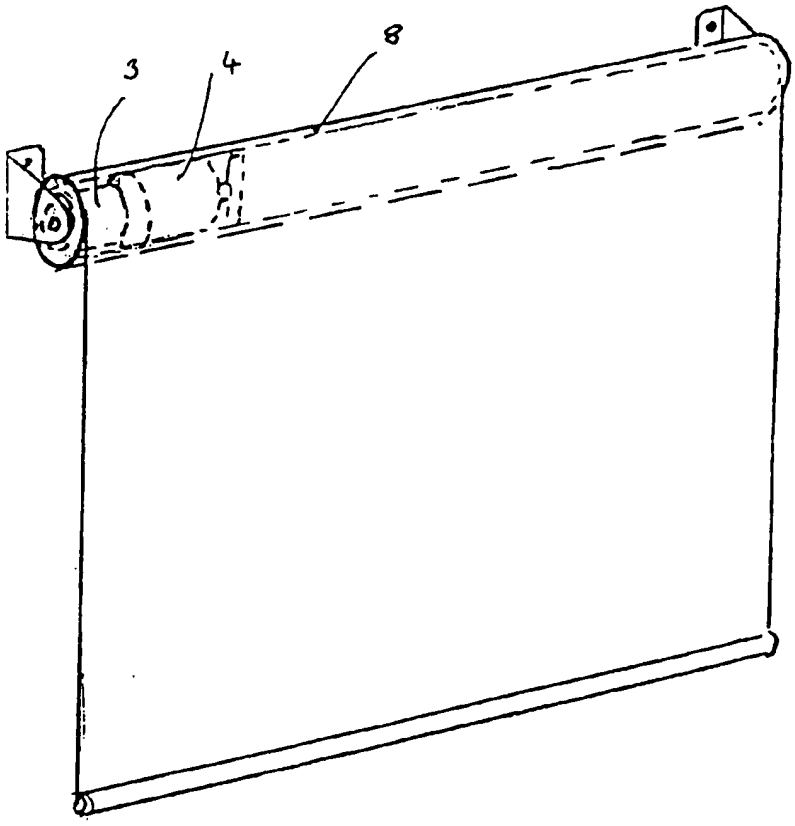

FIG. 5.

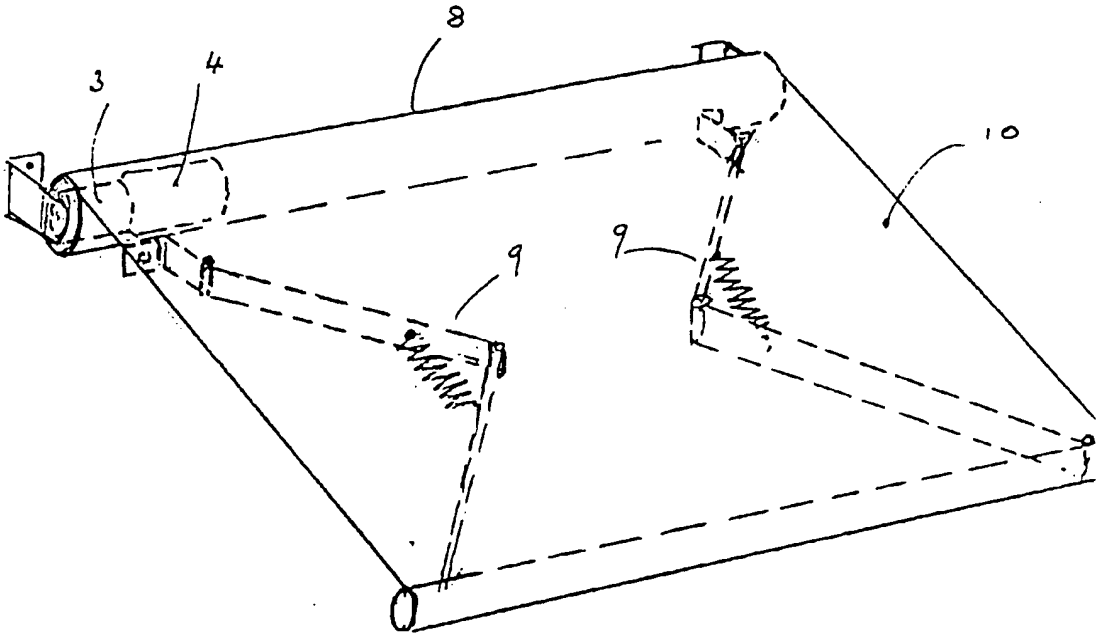

FIG. 6.

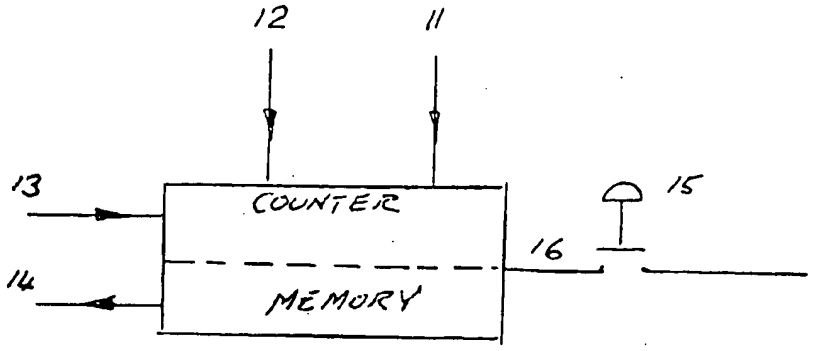

FIG. 7.